

***IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES***

Applicants: Isao MOCHIDA et al.

Title: Heat-Treated Active Carbons for Use in Denitration, Processes for Producing Same, Denitration Method Using Same, and Denitration System Using Same

Appl. No.: 10/081,208

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Examiner: Stuart L. HENDRICKSON

Art Unit: 1754

Confirmation Number:
4498

REPLY BRIEF UNDER 37 CFR § 41.41

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Sir:

This Reply Brief responds to the Examiner's Answer mailed September 7, 2007. This Reply Brief is timely filed within two months from the mailing date of the Examiner's Answer. Although no fee is believed to be associate with filing the Reply Brief, authorization is hereby given to charge any deficiency (or credit any balance) to the undersigned deposit account 19-0741.

STATUS OF CLAIMS

Claims 1-28 were/are in the record.

Claims 1-10 and 13-20 are cancelled.

Claims 11-12 and 21-28 are currently pending.

Claims 23-28 are rejected and appealed.

Claims 11-12 and 21-22 are withdrawn.

Appealed claims 23-28 are presented in Appendix A of this Brief.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection for review are as follows:

- A. The rejection of claims 23-28 under 35 U.S.C. § 103(a) as obvious over Seki (US patent no. 3,961,020) taken with Oikawa (US patent no. 4,831,011) in view of Liang (US patent no. 5,462,908);
- B. The rejection of claims 23-28 under 35 U.S.C. § 103(a) as obvious over Nishino (US patent no. 4,256,728) taken with Oikawa (US patent no. 4,831,011) in view of Liang (US patent no. 5,462,908).

ARGUMENT

- A. *KSR International Co. v. Teleflex Inc.* and the Examiner's New Arguments Do Not Render Claims 23-28 Unpatentable Under 35 U.S.C. § 103(a) over Seki (US patent no. 3,961,020) taken with Oikawa (US patent no. 4,831,011) in view of Liang (US patent no. 5,462,908).

In *KSR International Co. v. Teleflex Inc.*, 550 U.S._, 82 USPQ2d 1385 (2007), the Supreme Court very recently emphasized that the analysis supporting a rejection under 35 U.S.C. § 103(a) should be made explicit (even if the motivation supporting a combination of references is not expressly present in the references). The Supreme Court also stated, quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), that “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning the legal conclusion of obviousness.” *KSR International Co. v. Teleflex Inc.* did not introduce a new standard, according to which, the prior art in an obviousness rejection can be combined to achieve something approximating the claimed invention, instead of the claimed invention.

1. Claims 23-28 Are Patentable Over Seki, Oikawa and Liang Because The Examiner's Conclusory Statement About Oxygen Content Fails To Satisfy *KSR*'s Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

The Examiner fails to provide a clear articulation about why a combination of Seki, Oikawa and Liang teach or suggest a heat treated carbon having an atomic surface oxygen/surface carbon ratio of 0.05 or less. Instead, there is only a conclusory statement repeated on page 3, lines 18-19, of the Examiner's Answer.

Responding to Appellants' Argument in the paragraph bridging pages 4-5 of the Examiner's Answer, the Examiner acknowledges again the deficiency of Seki, Oikawa and Liang by stating “it cannot be determined what the oxygen content is” and uses the following assertion to remedy this deficiency: “The Examiner has provided evidence that it is possessed, due to the action of the bromine”.

Appellants disagree with the above cited assertion because the Examiner in fact did not provide any evidence that bromine treatment of carbon would predictably achieve an atomic surface oxygen/ surface carbon ratio of 0.05 or less. Appellants submit that none of Seki, Liang and Oikawa provides any evidence with respect to what atomic surface oxygen to surface carbon ratio can be predictably achieved via bromine treatment. Appellants provide citations from Liang, which appear to be the only possible evidence on which the Examiner could be relying, that "bromine treatment reduces oxygen content" in an unspecified and unquantified manner:

A similar benefit is achieved through pretreatment of the carbon surface by halogenation. The halogen reacts with the acidic oxygen-containing moieties on the carbon surface, thereby 'de-activating' them so that the subsequent physisorption of the active amine impregnant is not accompanied by reactions with surface acidic sites which would deplete the amount of amine available in the desired form. As with the alkaline pretreatment, halogenation serves a dual purpose since the resulting halide salts e.g. hydrogen halide salts, on the surface will also stabilize the amine molecules on the carbon surface by reducing the amount of dissociation. Thus alkaline or halogen pretreatments of the carbon surface remove the undesirable effect that would result from reaction with surface acidic oxides and at the same time provides a means for stabilizing the active amine impregnant in the undissociated form, see Liang, column 2, lines 46-62.

Appellants submit that the above citation of Liang is not evidence that bromine treatment of carbon would predictably achieve the presently claimed atomic surface oxygen/ surface carbon ratio of 0.05 or less. Accordingly, based on the combination of Seki, Liang and Oikawa, one of ordinary skill in the art could have only arrived at something approximating the claimed invention, but not at the claimed invention. Neither the rejection nor the references say anything at all about the desirability of adjusting surface oxygen so as to achieve a ratio of surface oxygen/surface carbon of 0.05 or less, much less that bromine treatment under particular conditions could lead to such a ratio.

In sum, no *prima facie* obviousness is established by the rejection because it relies only conclusory statements for supporting the obviousness rejection. There is no articulated reasoning about why a combination of Seki, Oikawa and Liang teach or suggest a heat treated carbon having an atomic surface oxygen/ surface carbon ratio of 0.05 or less. Accordingly, the rejection should be reversed in its entirety.

2. Claims 25-26 Are Patentable Over Seki, Oikawa and Liang Because The Examiner's Conclusory Statement About Valve Arrangement Fails To Satisfy KSR's Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

In further violation of *KSR*, the Examiner also failed to provide a clear articulation about why Seki, Oikawa and Liang teach or suggest the particular arrangement of six valves with respect to the first and second reactors as required in elements (i)-(iii) of claims 25-26. Instead, the Examiner relies on conclusory statements repeated in the Examiner's Answer on page 3, lines 21-25.

Responding to Appellants' arguments on page 5 of the Examiner's Answer, the Examiner provided an additional commentary on his position concerning the valves of claim 25. In particular, the Examiner referred to a six valve system and multiple reactors in Fig. 3 of Seki. In response, Appellants submit that the Examiner failed to provide a clear articulation of anything that would motivate one of ordinary skill in the art to predictably arrive at the claimed arrangement of six valves with respect to the first and second reactors as reflected in elements (i)-(iii) of claims 25-26, based on Seki's disclosure of six valve system and multiple reactors. Appellants further submit that the Examiner, instead of providing an explicit reasoning underlying his position, again uses a conclusory statement to support the rejection:

"If there is any difference, then the claimed valve arrangement is an obvious expedient to be able to recycle the gas, to selective regenerate the sorbent bed or perform other tasks routine in the art-see Seki col. 8-9", the Examiner's Answer, page 5, lines 12-14.

Appellants submit that elements (i)-(iii) of claim 25 recite the following valve arrangement:

- (i) the outlet of the first reactor is connected to the inlet of the second reactor through the third valve and to the system outlet through the fourth valve,
- (ii) the outlet of the second reactor is connected to the system outlet through the fifth valve and the inlet of the first reactor through the sixth valve, and
- (iii) if the first, third and fifth valves are open, the second, fourth and sixth valves are

closed, and if the first, third and fifth valves are closed, the second, fourth and sixth valves are open”

and Seki teaches none of the elements (i)-(iii).

Responding to Appellants’ arguments, the Examiner stated that element (iii) of claim 25 “is a ‘conditional limitation’ and hence an option which is not required”, see the Examiner’s Answer, page 5, lines 9-10. Furthermore, the Examiner asserted that element (iii) of claim 25 is not a structural limitation by stating that element (iii) “does not alter the actual valve structure claimed”, see the Examiner’s Answer, page 5, lines 10-11.

In response, Appellants submit that, contrary to the Examiner’s assertions on page 5, lines 9-11 of the Examiner’s Answer, element (iii) of claim 25 is a structural limitation, because it defines an operational relationship between the first, third and fifth valves on one hand and the second, fourth and sixth valves on the other hand, and such a relationship has to be supported by a corresponding structure of the claimed system.

In sum, Appellants request reversal of the rejection in its entirety.

3. Claims 27-28 Are Patentable Over Seki, Oikawa and Liang Because The Examiner’s Conclusory Statement About Valve Arrangement Fails To Satisfy KSR’s Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

Appellants submit that the Examiner’s Answer further violates KSR by failing to articulate any motivation as to how one of ordinary skill in the art would predictably arrive at the particular arrangement of six valves with respect to the denitrator and the first and second NH₃ adsorbers required by elements (i)-(viii) of claims 27-28 based on Seki, Oikawa and Liang.

Accordingly, the rejection should be reversed in its entirety.

4. Claims 24, 26, And 28 Are Patentable Over Seki, Oikawa and Liang Because The Examiner’s Conclusory Statement About Oxygen Content Fails To Satisfy KSR’s Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

Appellants submit that the Examiner's Answer does not provide any further articulation about why one of ordinary skill in the art would predictably arrive at a heat treated carbon fiber having an atomic surface oxygen/ surface carbon ratio of 0.05 or less required by each of claims 24, 26 and 28, based on Seki, Oikawa and Liang.

Accordingly, the rejection should be reversed in its entirety based on the reasons presented in the Appeal Brief.

B. *KSR International Co. v. Teleflex Inc.* and the Examiner's New Arguments Do Not Render Claims 23-28 Are Not Obvious Under 35 U.S.C. § 103(a) Over Nishino (US patent no. 4,256,728) Taken With Oikawa (US patent no. 4,831,011) In View Of Liang (US patent no. 5,462,908).

1. Claims 23-28 Are Patentable Over Nishino, Oikawa and Liang Because The Examiner's Conclusory Statement About Oxygen Content Fails To Satisfy KSR's Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

The Examiner fails to provide a clear articulation about why Nishino, Oikawa and Liang, teach or suggest a heat treated carbon having an atomic surface oxygen/ surface carbon ratio of 0.05 or less. Instead, the Examiner relies on a conclusory statement repeated on page 4, lines 8-9, of the Examiner's Answer.

Responding to Appellants' Arguments in the Examiner's Answer, the Examiner uses the same commentary for the rejection over Nishino, Oikawa and Liang as for the rejection over Seki, Oikawa and Liang: "it cannot be determined what the oxygen content is. The Examiner has provided evidence it is possessed, due to the action of the bromine", page 4, last line, through page 5, 1st line.

Appellants disagree with the above assertions by the Examiner. As Appellants explained in section A.1., the Examiner in fact did not provide any evidence that bromine treatment would predictably achieve an atomic surface oxygen/ surface carbon ration of 0.05 or less. Appellants submit that none of Nishino, Liang and Oikawa provides any evidence with respect to what atomic surface oxygen to surface carbon ratios can be predictably achieved via bromine treatment. Appellants submit that Liang, column 2, lines 46-62 is not

evidence that bromine treatment of carbon would predictably achieve an atomic surface oxygen/ surface carbon ratio of 0.05 or less.

In sum, no *prima facie* case of obviousness is established by the Examiner. Accordingly, the rejection should be reversed in its entirety.

2. Claims 25-26 Are Patentable Over Nishino, Oikawa and Liang Because The Examiner's Conclusory Statement About Valve Arrangement Fails To Satisfy KSR's Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

Appellants submit that the Examiner's Answer does not provide any further articulation about how, based on Nishino, Oikawa and Liang, one of ordinary skill in the art would predictably arrive at the particular arrangement of six valves with respect to the first and second reactors as reflected in elements (i)-(iii) of claims 25-26.

Accordingly, Appellants request reversal of the rejection in its entirety.

3. Claims 27-28 Are Patentable Over Nishino, Oikawa and Liang Because The Examiner's Conclusory Statement About Valve Arrangement Fails To Satisfy KSR's Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

Appellants submit that the Examiner's Answer does not provide any further articulation on how, based on Nishino, Oikawa and Liang, one of ordinary skill in the art would predictably arrive at the particular arrangement of six valves with respect to the denitrator and the first and second NH₃ adsorbers as reflected in elements (i)-(viii) of claims 27-28.

Accordingly, Appellants request reversal of the rejection in its entirety.

4. Claims 24, 26, And 28 Are Patentable Over Nishino, Oikawa and Liang Because The Examiner's Conclusory Statement About Oxygen Content Fails To Satisfy KSR's Requirement For An Explicit Analysis, So There Is No *Prima Facie* Case Of Obviousness.

Appellants submit that the Examiner's Answer does not provide any further articulation about why, based on Nishino, Oikawa and Liang, one of ordinary skill in the art

would predictably arrive at a heat treated carbon fiber having an atomic surface oxygen/surface carbon ratio of 0.05 or less required by each of the claims 24, 26 and 28.

Accordingly, Appellants request reversal of the rejection in its entirety.

CONCLUSION

For above-discussed reasons and those presented in their main brief, Appellants submit that the appealed rejections should be reversed and the pending claims allowed to issue.

Respectfully submitted,

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APPENDIX A: CLAIMS INVOLVED IN APPEAL

23. A denitration system comprising

- (A) a first reactor that has an inlet and an outlet and that is packed with a heat treated active carbon having an atomic surface oxygen/ surface carbon ratio of 0.05 or less;
- (B) a second reactor that has an inlet and an outlet and that is packed with said heat treated active carbon, wherein the outlet of the first reactor is connected to the inlet of the second reactor;
- (C) an ammonia supply line that is connected the inlet of said first reactor;
- (D) a system inlet that is connected to the inlet of said first reactor; and
- (E) a system outlet that is connected to the outlet of the second reactor.

24. The denitration system of claim 23, wherein the heat treated active carbon is a heat treated carbon fiber.

25. A denitration system comprising

- (A) a first reactor that has an inlet and an outlet and that is packed with a heat treated active carbon having an atomic surface oxygen/ surface carbon ratio of 0.05 or less;
 - (B) a second reactor that has an inlet and an outlet and that is packed with said heat treated active carbon;
 - (C) an ammonia supply line that is connected to the inlet of the first reactor through a first valve and to the inlet of the second reactor through a second valve;
 - (D) a system inlet that is connected to the inlet of the first reactor through the first valve and to the inlet of the second reactor through the second valve; and
 - (E) an outlet of the denitration system,
- wherein
- (i) the outlet of the first reactor is connected to the inlet of the second reactor through the third valve and to the system outlet through the fourth valve,
 - (ii) the outlet of the second reactor is connected to the system outlet through the fifth valve and the inlet of the first reactor through the sixth valve, and
 - (iii) if the first, third and fifth valves are open, the second, fourth and sixth valves are

closed, and if the first, third and fifth valves are closed, the second, fourth and sixth valves are open.

26. The denitration system of claim 25, wherein the heat treated active carbon is a heat treated carbon fiber.

27. A denitration system comprising

- (A) a denitrator that has an inlet and an outlet and that is packed with a heat treated active carbon having an atomic surface oxygen/ surface carbon ratio of 0.05 or less;
- (B) a first NH₃ adsorber that has an inlet and an outlet;
- (C) a second NH₃ adsorber that has an inlet and an outlet;
- (D) a first ammonia supply line;
- (E) a second ammonia supply line;
- (F) a system inlet; and
- (G) a system outlet,

wherein

- (i) the system inlet is connected to the inlet of the first adsorber via a first valve and to the outlet of the second adsorber through a second valve;
- (ii) the first ammonia supply line is connected to both the inlet of the denitrator and the outlet of the first adsorber through a third valve;
- (iii) the second ammonia supply line is connected to both the outlet of the denitrator and the inlet of the second adsorber through a fourth valve;
- (iv) the inlet of the denitrator is connected to the outlet of the first adsorber;
- (v) the outlet of the denitrator is connected to the inlet of the second adsorber;
- (vi) the outlet of the second adsorber is connected to the system outlet through a fifth valve;
- (vii) the inlet of the first adsorber is connect to the system outlet through a sixth valve; and
- (viii) if the first, third and fifth valves are open, the second, fourth and sixth valves are closed, and if the first, third and fifth valves are closed, the second, fourth and sixth valves are open.

28. The denitration system of claim 27, wherein the heat-treated active carbon is a heat treated carbon fiber.